Forest Health Protection
Pacific Southwest Region

Date: September 30, 2019
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To: Ben Sundal, Shasta Lake District Ranger (acting), Shasta-Trinity National Forest

Subject: Hirz Campgrounds

At the request of Todd Hamilton (Forester), a site visit was made to the Hirz Campgrounds, Shasta-Trinity National Forest, on September 30, 2019. The objectives were to assess the current insect and disease conditions and recommend treatments.

Background

Hirz Bay is a popular destination for year-round camping along Shasta Lake (Figure 1). The area is in the lower elevation oak-pine habitat overlooking the McCloud Arm of Shasta Lake. The location offers a variety of recreational activities, including a boat ramp and a hiking trail. Each campsite in the main campground contains a paved parking spur, a table, a bear-proof food locker and fire ring. The main campground has 42 sites and there are 2 large group camps.

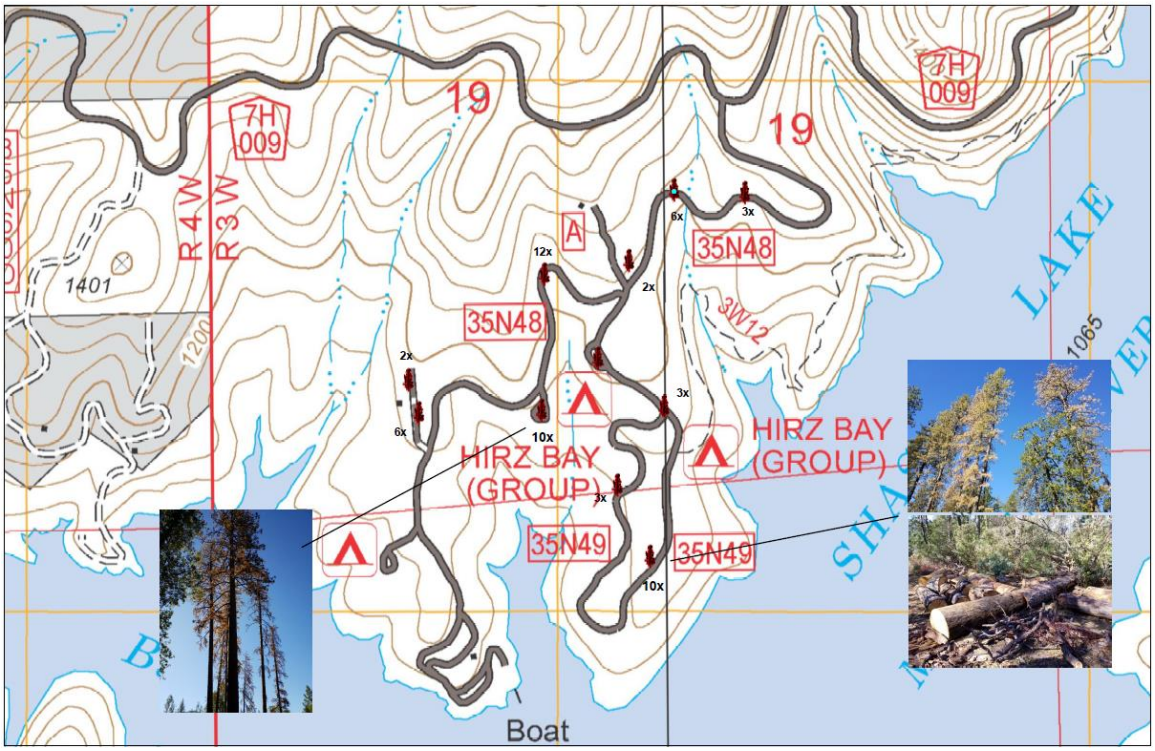

Figure 1. Hirz Bay recreation area affected by ongoing ponderosa pine mortality.

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Todd Hamilton had started plans to conduct thinning operations in the campgrounds several years ago, but the plans had been put on hold as other priorities arose. In 2018, the Hirz Fire burned 46,150 acres surrounding Hirz Bay. In 2019, pine mortality was noted in patches throughout the unburned Hirz Bay and many trees were cut down in the campground and surrounding facilities to mitigate hazard.

Plant Pathologist, Bill Woodruff, from the Northeastern Zone was available to come out to the Shasta-Trinity NF. Joseph Stubbendick (Special Uses Administrator), Cindy Luzietti (Recreation Planner), and Kaela Gamio were able to show us the affected trees and discuss insect and disease issues and treatment options.

Observations and Discussion

Looking over the aerial survey data from the past three years, I noted that western pine beetle (*Dendroctonus brevicomis*) was active in Hirz Bay in 2016. The mortality that occurred in 2018 did not get mapped due to the Hirz Fire. Mortality in 2019 was mostly missed in the aerial survey. Pockets of ponderosa pine mortality, 3-10 trees, are common all along the shoreline of Shasta Lake (Figure 2).

Figure 2. Ponderosa pine mortality along Hirz Bay.

Mortality in the main campground and the group camps is much higher than normal. Many campsites had several trees already cut down to mitigate hazard (Figure 3) but several more trees had died since the cutting last spring (Figure 4). In all cases, the pine mortality was caused by western pine beetle.

Figure 3. Ponderosa pine cut down to mitigate hazard in campground.

Figure 4. New ponderosa pine mortality since cutting in spring 2019.

During the site visit, we discussed why thinning is recommended as the most effective treatment for reducing western pine beetle-caused tree mortality.

Individual trees utilize factors, such as sunlight, water, and nutrients until one or more become limiting. This is the basis for the concept of growing space, which varies spatially and temporally. As growing space diminishes, a tree's photosynthates are allocated to different uses in an order of priorities: (1) maintenance respiration for survival, (2) production of fine roots to increase access to water and nutrients, (3) reproduction, (4) growth, and (5) insect and disease resistance mechanisms. This hierarchy is not absolute, but illustrates how production of insect resistance mechanisms may be compromised when growing space becomes limited.

Trees with adequate growing space are thought to be more vigorous and are better able to protect themselves against attack by bark beetles. Most coniferous species, particularly pines, have a well-defined resin duct system, which is capable of mobilizing large amounts of oleoresin (pitch) following wounding. Beetles that initiate attack are often killed by drowning or immobilization in resin. The amount of resin available is associated with the amount of moisture trees are able to access. However, the availability of moisture to trees is not solely regulated by the amount of precipitation, but also by its distribution and storage (compacted soils often associated with campgrounds hold less moisture) and forest structure (stand density is consistently identified as primary attribute

associated with bark beetle infestations). The current stand densities we saw were above basal areas of 200 square feet per acre. In most dry pine sites, those without the added stress of being within a popular campground, basal areas should be 100-120 square feet per acre for resilience to bark beetle attack.

Western pine beetle is the most common threat to ponderosa pine in northwestern California. There are generally two generations per year. Most of the time, the populations of these native insects are at low levels, and the beetles attack stressed, damaged, or weakened ponderosa pines. Trees damaged mechanically or by lightning are often targets of attack, as are diseased host trees. Western pine beetle populations often increase dramatically during periods of drought. Thinning improves tree vigor, reduces a tree's susceptibility to bark beetles and also lowers the potential for catastrophic fire. Because of this, the highest priority areas for thinning are in and around forested communities and at high value recreation sites.

I suggested that thinning should bring the stand density below a basal area of 100 with the heaviest thinning in areas where soil compaction by campers would be greatest. Thinning between the campgrounds in the surrounding forest would decrease the risk of western pine beetle caused mortality building next to the campgrounds.

There were also many trees with symptoms of Diplodia blight scattered through the campgrounds and surrounding forest. Diplodia blight is a common fungal disease of stressed conifers, especially pines, caused by the pathogen *Sphaeropsis sapinea.* It is common in northern California and is often seen following wetter than normal springs at the time of bud break when the pathogen infects and kills the new needles. The damage caused by this disease is most severe on old or weakened trees.

This fungus is present throughout the year in dead needles and twigs located either on an infected tree or on the ground. Small black fruiting bodies mature during late spring or early summer in this material. These fruiting bodies sporulate during wet conditions and are scattered by wind, splashing rain, animals, or pruning equipment. Spores that land on young needles and germinate produce the fungus that enters the needle through a stomate (or pore) and grows toward the base of the needle. The fungus continues to grow into the twig. The progressive invasion of the twig by the fungus results in browning of the attached needles and canker production in the twig. The loss of needles and thus photosynthates, make infected trees more susceptible to attack by bark beetles.

Management options include pruning and sanitation of blighted twigs. Since fungal spores can be transported to healthy twigs during the pruning process, prune when the tree is dry and disinfect pruning tools before each cut by swabbing the cutting blades with a solution of 70% rubbing alcohol. Rake up all blighted needles, twigs, and cones which harbor the fungus and destroy or discard them.

If you have any questions regarding this report and/or need additional information, please contact Cynthia Snyder at 530-226-2437.

/s/ Cynthia Snyder

CC: Todd Hamilton, Joseph Stubbendick, Cindy Luzietti, Kaela Gameo, Bill Woodruff, Chris Losi, Sheri Smith, Phil Cannon,